

## WHAT IS CLAIMED IS:

1. A steering-wheel connector assembly for elastically connecting a steering wheel of a vehicle to a rotary member which is supported by a stationary member fixed to a body of the vehicle such that the rotary member is rotatable about an axis thereof, upon rotation of the steering wheel to steer the vehicle, said connector assembly comprising:

a first member to be fixed to said rotary member such that said first member and said rotary member are rotatable as a unit;

a second member to be fixed to said steering wheel such that said second member and said steering wheel are rotatable as a unit;

an elastic body interposed between said first and second members such that said steering wheel is elastically connected to said rotary member by only said elastic body through said first and second members; and

relative-rotation restricting means located between said first and second members, for restricting an amount of elastic deformation of said elastic body upon a rotary motion of said second member relative to said first member, to restrict a maximum angle of rotation of said second member relative to said first member, which rotation is permitted by the elastic deformation of said elastic body, whereby a maximum angle of rotation of said steering wheel relative to said rotary member is restricted by said relative-rotation restricting means.



2. The steering-wheel connector assembly according to claim 1, wherein said rotary member is a steering shaft operatively connected to a steerable wheel of the vehicle.

3. The steering-wheel connector assembly according to claim 1, wherein said elastic body has at least one void formed therethrough so as to extend in an axial direction of said steering wheel.

4. The steering-wheel connector assembly according to claim 3, wherein said at least one void consists of a plurality of voids including two voids which are opposed to each other in a diametric direction of said steering wheel.

5. The steering-wheel connector assembly according to claim 4, wherein said plurality of voids consist of four voids which are equally spaced from each other by an angular interval of  $90^\circ$  in a rotating direction of said steering wheel.

6. The steering-wheel connector assembly according to claim 3, wherein at least one of said at least one void is partially defined by at least one pair of opposed inner surfaces which are opposed to each other in a rotating direction of said steering wheel, and which are brought into abutting contact with each other upon a rotary motion of said steering wheel relative to said rotary member.



7. The steering-wheel connector assembly according to claim 1, wherein said first member consists of an inner cylindrical member to be coaxially fixed to said rotary member, and said second member consists of an outer cylindrical member which is disposed radially outwardly of said inner cylindrical member with a predetermined radial spacing therebetween and which is to be coaxially fixed to said steering wheel, said elastic body being interposed between said inner and outer cylindrical members, and wherein said relative-rotation restricting means includes a plurality of projections each of which extends from one of an outer circumferential surface of said inner cylindrical member and an inner circumferential surface of said outer cylindrical member toward the other of said outer and inner circumferential surfaces, so as to substantially isolate said elastic body into a plurality of portions.

8. The steering-wheel connector assembly according to claim 1, wherein said first member consists of a hollow inner member open at one of opposite ends thereof and having a bottom wall which closes the other of said opposite ends and at which said hollow inner member is to be fixed to said rotary member, and said second member consists of a cylindrical outer member which is disposed outwardly of said hollow inner member with a predetermined spacing therebetween in a radial direction of said cylindrical outer member and which is to be coaxially fixed to said steering wheel, said elastic body being



interposed between said inner and outer cylindrical members, and wherein said hollow inner member has side walls which cooperate with said bottom wall to define a hollow of the hollow inner member and which provide a plurality of projections extending toward an inner circumferential surface of said cylindrical outer member, so as to substantially isolate said elastic body into a plurality of portions, said relative-rotation restricting means including said plurality of projections.

9. The steering-wheel connector assembly according to claim 1, wherein said first member consists of a first planar member to be fixed to an end portion of said rotary member, and said second member consists of a second planar member which is spaced apart from said first planar member in an axial direction of said rotary member and which is to be fixed to said steering wheel, said elastic body consisting of a plurality of elastic members which are interposed between said first and second planar members and which are spaced apart from each other in said axial direction of said rotary member, and wherein said relative-rotation restricting means includes at least one axial projection each of which extends from one of said first and second planar members toward the other of said first and second planar members, between adjacent ones of said plurality of elastic members, such that said each axial projection is spaced apart from said adjacent ones of said plurality of members.

10. A steering-wheel connecting device for



elastically connecting a steering wheel of a vehicle to a rotary member which is supported by a stationary member fixed to a body of the vehicle such that the rotary member is rotatable about an axis thereof, upon rotation of the steering wheel to steer the vehicle, said connector assembly comprising:

a first member to be fixed to said rotary member such that said first member and said rotary member are rotatable as a unit;

a second member to be fixed to said steering wheel such that said second member and said steering wheel are rotatable as a unit;

an elastic body interposed between said first and second members such that said steering wheel is elastically connected to said rotary member by only said elastic body through said first and second members; and

relative-rotation restricting means located between said first and second members, for restricting an amount of elastic deformation of said elastic body upon a rotary motion of said second member relative to said first member, to restrict a maximum angle of rotation of said second member relative to said first member, which rotation is permitted by the elastic deformation of said elastic body, whereby a maximum angle of rotation of said steering wheel relative to said rotary member is restricted by said relative-rotation restricting means.

11. The steering-wheel connecting device according to claim 10, wherein said relative-rotation restricting



means is provided in a connector assembly which includes said first and second members and said elastic body and which is to be used in a steering system of the vehicle that includes said steering wheel and said rotary member.

12. The steering-wheel connecting device according to claim 10, wherein said relative-rotation restricting means is provided on said first member of said connector assembly.

13. The steering-wheel connecting device according to claim 10, wherein said relative-rotation restricting means includes at least one axial projection each of which extends from said steering wheel in an axial direction of said steering wheel such that said each of said at least one axial projection is located between said first and second members, said at least one axial projection being brought into abutting contact with said elastic body in a radial direction of said rotary member upon a rotary motion of said second member relative to said first member, whereby an amount of elastic deformation of said elastic body is restricted by said at least one axial projection.